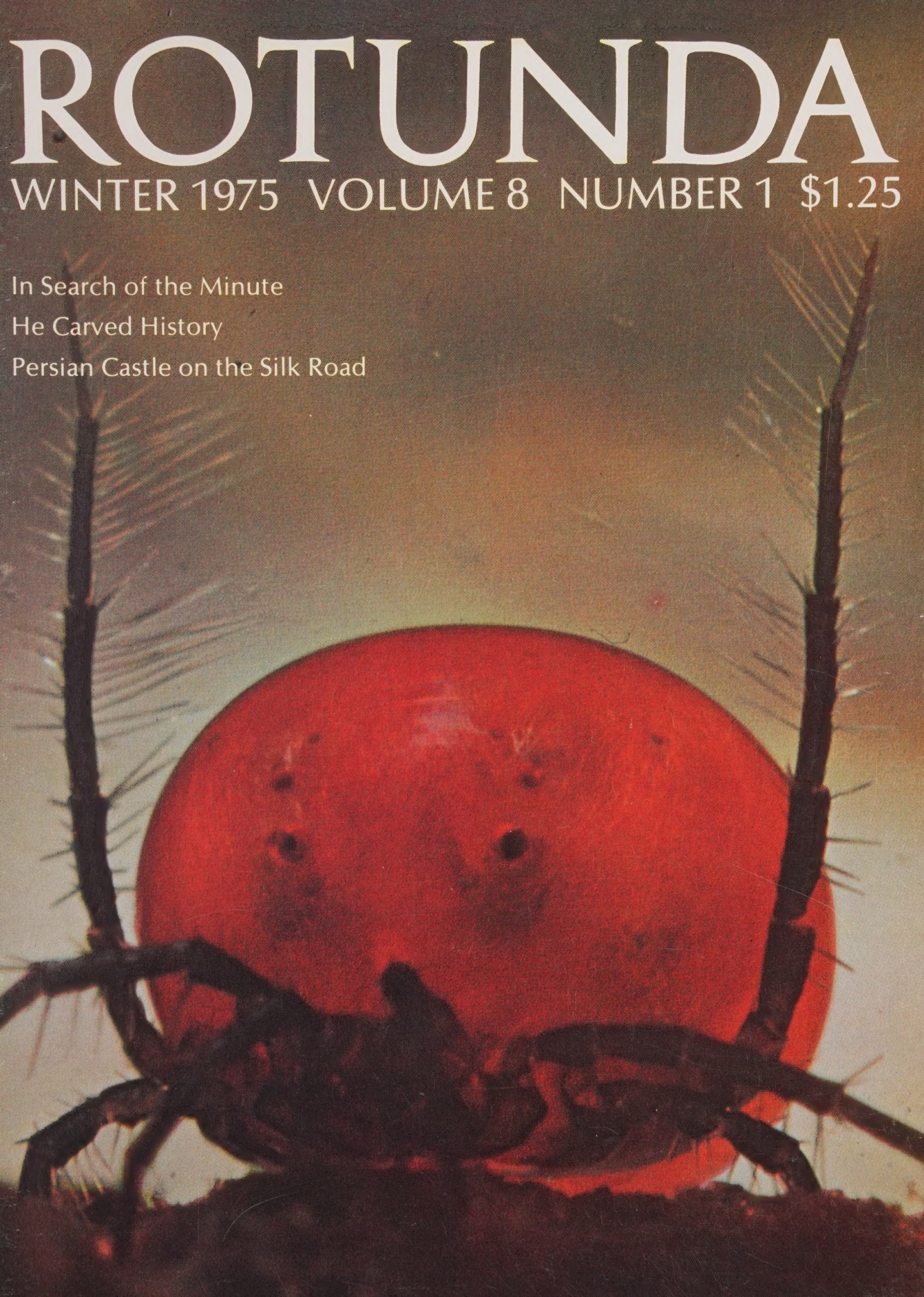
ROTUNDA

WINTER 1975 VOLUME 8 NUMBER 1 $1.25

In Search of the Minute

He Carved History

Persian Castle on the Silk Road



ROTUNDA

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Volume 8, Number 1, Winter 1975

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Cover: A flamboyant water mite of the species Limnesia. *The actual diameter of the body is about 2 mm. See p. 4. (Photo Helen Sutton)*

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On a Barye Bronze in the ROM

K. Corey Keeble *European Department*

During the 17th and 18th centuries, the period of the Baroque and later the Rococo in European art, the independent bronze statuette lost the prestige and favour it had enjoyed in the Renaissance. In the 19th century, however, interest in this form of sculpture was renewed, especially in France. In the hands of such sculptors as Antoine Louis Barye (1795-1875) this genre reached new heights of artistic expression in forms that were fully in keeping with the predominant spirit of Romanticism.

Barye is best known for his sculptures of animals, particularly lions, tigers, and other carnivores, depicted in violent action. Such subjects were not new to European art. In the 17th century scenes of hunting and of animals fighting had enjoyed a considerable vogue. Even in the more sedate period of the 18th-century Rococo, depictions of such bloody spectacles retained their popularity with some artists. For example, Dominikus Auliczek, a porcelain sculptor at the Nymphenburg factory in Bavaria, was noted for his almost pathological obsession with scenes of animals tearing one another to pieces. With Barye, animal sculpture rises above such distasteful sadism, and, moreover, in spite of obvious influences from the art of earlier periods, it transcends eclecticism and achieves grandeur and power in a way which is harmonious with the *Sturm und Drang* of European 19th-century Romantic art. His sculpture is at one with the poetry of Byron, the music of Beethoven and Berlioz, and the paintings of Delacroix.

Barye began to exhibit animal subjects at the Paris Salon in the 1830's. His choice of subjects was no doubt partially conditioned by his association with the goldsmith Fauconnier, for whom he had worked making models of animals, between 1823 and 1831 in the Jardin des Plantes. One of his earliest Salon pieces was a rearing horse in plaster exhibited in 1833, which was to be adapted for future compositions.

In 1838 Barye set up a workshop for casting his models in bronze. He adopted the *cire perdue* technique, which gave him maximum control over the quality of his castings, and insisted on finishing and patinating them himself. Such devotion to his art was, alas, not economically viable in an age of burgeoning industrialism, and he experienced the trauma of bankruptcy and the loss of his models in 1848 to Emile Martin. Martin reproduced them by the sand-casting technique until 1857, when Barye, by this time on the financial rebound, was able to buy them back.

Among Barye's more notable animal subjects were a series of "hunts" commissioned in 1832 as part of a *surtout de table* for the Duc d'Orléans. Five of these were completed, among which was The *Lion Hunt* completed in 1837, signed "BARYE 1837" and inscribed

Left: Barye's Arab Rider Killing a Lion, *bronze, c. 1860, h. 14 15/16 in., a sculptural composition in* ROM*'s European Department which reflects the spirit of 19th-century Romanticism (*ROM *photo)*

Barye's Lion Hunt, *signed and dated 1837, h. 17 7/8 in. Originally produced as a* surtout de table *for the Duc d'Orléans, this piece was the inspiration for later versions of the same theme, including the* ROM *composition on the page opposite. (Courtesy Walters Gallery, Baltimore)*

"Bronze d'un seul jet sans ciselure coule a l'hotel d'Angivilliers par Honore Gonon et ses deux fils". This original and unique group, showing two Arab horsemen struggling against a lion and buffalo, was sold in 1853 by the Duchesse d'Orléans to M. Montessier. From him it later passed into the possession of the noted American collector W.T. Walters of Baltimore, Maryland, who succeeded in re-uniting all of the five groups from the *surtout* in his own private collection. Such was Mr. Walters' enthusiasm for Barye's sculpture that in addition to preserving the pieces from the Orleans *surtout*, he became after 1860 Barye's chief patron, and today the Walters Gallery in Baltimore is the repository of many of the finest Barye bronzes extant.

The *Lion Hunt* provided the inspiration for later Barye bronzes incorporating the same motif. The later versions represent progressive simplifications of the original idea and are encountered in two basic forms. In the first of these, dating from 1847 and listed in Barye's first catalogue for that year, two Arab riders are seen killing a lion. One of the riders, on his rearing horse, lunges at the animal with a lance, while a second rider, armed with a gun, attempts to spring free of his stumbling mount. Examples of this group, released as an "edition" bronze are found in several public collections, such as the Brooklyn Museum of Art, the New York Metropolitan Museum of Art, the Corcoran Gallery in Washington, and the Walters Art Gallery in Baltimore.

Some time after 1855, a further simplification of the *Lion Hunt* appeared in the form of a composition. It was listed as No. 8 in Barye's penultimate catalogue issued from the Quai des Celestins, Paris. In this group, the Arab rider wielding a spear and the thrashing figure of the lion from the 1847 group were formed into a single composition called *Arab Rider Killing a Lion*. As a pendant, the falling rider from the 1847 group was also issued as a separate bronze, so that by a simple act of division the 1847 composition was effectively turned into two separate, free-standing sculptural groups.

It is the *Arab Rider Killing a Lion*, from the penultimate catalogue, which is represented in the collections of the ROM's European Department. This piece shows an Arab horseman, clad in a burnouse, driving his lance into the throat of an enraged and clawing lion, which lies on its back beneath the thrashing hooves of the rider's rearing steed. Horse and rider are identical to those of the 1847 catalogue, and in turn are seen to relate to a horse and rider on the Orléans *surtout*. The horse is similar to another Barye work, *Lion Attacking a Horse*, first modelled in plaster in 1833, and cast in bronze in 1844.

In Search of the Minute

Top: The underside of this female mite of the Arrenurus *genus reveals most of the structures used to identify water mites. (All three photos Helen Sutton)*

Right: Males of the genus Arrenurus *bear an elaborate sculptured caudum or tail-structure.*

Opposite: Just hatched from the resting imagochrysalis stage (attached to stem above), this adult pond mite of the Eylais *species sets out to explore its environment.*

David Barr

The title of this article was not deliberately chosen to be misleading—it just turned out that way. Like everyone else, I am always in search of a minute here or there, and if I could put together enough minutes, perhaps there would be a spare hour to catch my breath. But what I really want to describe here is a search that involves several ROM staff members, several students, and several colleagues—a search for the minute (mine-YOOT), the very, very small.

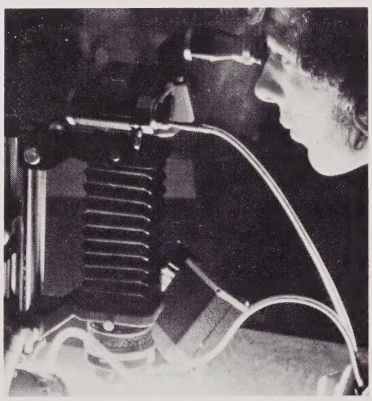
When you visit the Museum or read through the pages of *Rotunda*, you see the achievements of a variety of people in this institution who are engaged in a life-long search for many rare and unusual things. A researcher in the Planetarium, using a radio telescope, seeks out immense galaxies at unimaginable distances from earth. Mineralogists scramble through rock piles looking for crystals unique in size, colour, shape, and beauty, while numerous archaeologists search for the very rare, the very old, or the very beautiful among the products of man's artistry from cultures all around the world. I look for something different from all of these, but something as far removed from our daily lives as any of them. I am looking for living organisms so small that some of them are barely visible to the naked eye. It is a search for animals that are all around us and yet are so little known as to constitute an exotic world in our back yard.

The animals I study are called water mites. They are related most closely to the other mites, including ticks and chiggers, and also to the more familiar arachnids such as spiders, scorpions, and harvestmen. Like all arachnids, water mites have eight legs, and like all mites, they have a sac-like body without head, neck, or other visi-

ble division. Unlike almost all of their land-bound relatives, water mites are a group of animals that have returned to the water. They inhabit all sorts of natural water bodies almost everywhere in the world and abundantly in Ontario. The largest water mites are no more than a quarter of an inch long. The smallest adult mite is about the size of the period at the end of this sentence. Yet in spite of diminutive size, they are remarkably rich in shapes and display a spectrum of colours, ranging from bright scarlet through oranges, yellows, browns, greens, blue, and even violet.

And they are found almost everywhere. I first became interested in water mites while working as a student assistant on a Museum field trip to western Canada, organized by Dr. G.B. Wiggins in 1962. We stopped again and again, almost endlessly it sometimes seemed to me, at pond after pond, ditch after ditch, and stream after stream, all the way from Toronto to British Columbia. Collecting aquatic invertebrates of all kinds, I was struck again and again by the presence of mites, tiny, madly swimming little daredevils, careening through the water, their eight legs whirling like miniature windmills. Other creatures were present here and there, but there were mites in almost every body of water from which we collected. It eventually became a kind of game to see if I could find at least one mite in every puddle, trickle, or damp spot along the way. And they were always different, now flattened and red, clinging to strands of moss, now brightly spotted blue, red, and green, tumbling along the bottom of a clear mountain lake, now jade green, darting through tangled vegetation in a teeming prairie slough.

A water mite exoskeleton prepared for microscopic study



Bruce Smith photographing swimming mites by electronic flash (Both photos D. Barr)

There are many different ways to collect water mites—anyone who has a kitchen strainer and is not afraid to get his feet wet can surely find some in a pond or lake close to home. We use high rubber waders, an aquatic dip net, and shallow, white trays to collect most standing-water habitats. The technique is simple. You wade into the water with the net, sweep it through the vegetation, stirring up the bottom a bit, and then carry a net full of debris back to the shore, where the contents are dumped into the shallow tray of water. The active mites swim immediately out of the debris and vegetation. They are picked up with something resembling a large medicine dropper, and are placed in a collecting vial.

The idea of merely wading out from the margin of a lake or pond is not nearly so simple as it sounds. A great many of those innocent-looking shorelines have a bottom that is a tangle of sunken branches, snarled roots, and treacherous mats of vegetation that can give way at any moment and plunge one down three feet into soft mud or silt. Everyone seems to get wet at least once per season, and the inexperienced can expect a dunking quite a few times more. On a recent field trip to the Parry Sound region of Ontario, Bruce Smith, a student assistant, and I were collecting from a number of soft-bottomed lakes one afternoon and managed to soak not only one pair of hip waders each but also a spare pair apiece that each of us had brought along for emergencies. The truck that we were using as a field vehicle must have been a heroic sight that evening as we returned to our base camp with the upper ends of eight different rubber waders sticking out of various windows of the vehicle in the

hope that the rush of air would dry them sufficiently for tomorrow's use. After a day of collecting with wet feet, nothing feels better than to return to camp and change into dry socks and comfortable shoes.

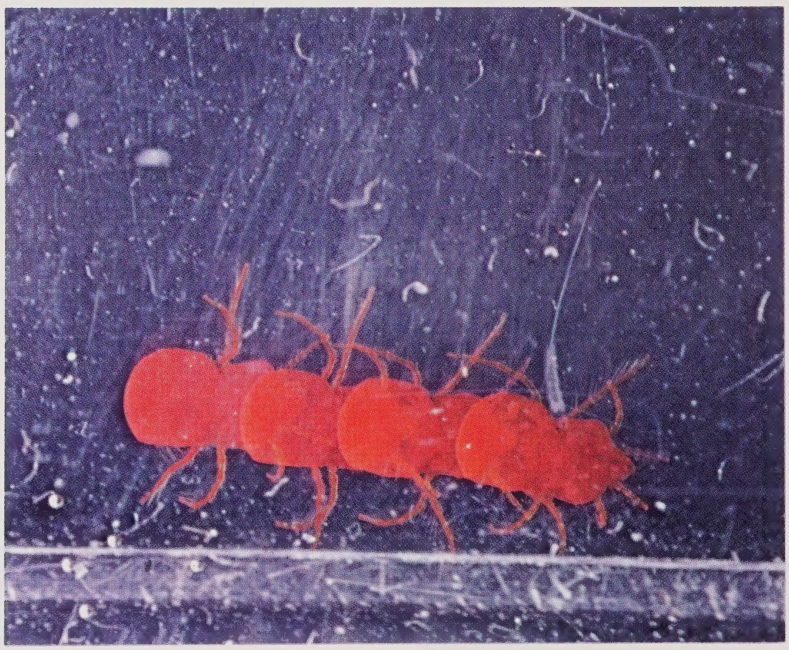
Of course, there are many other types of habitats in which mites live and countless other ways of collecting them. In streams we may use the dip net or a fine-meshed plankton net for extremely small species. We can also try to pick them from the underside of rocks or coax them out of vegetation collected from the stream and laid out in a tray of water. In many ponds the dip net can be used also, but some ponds and ditches are so small that one collects on hands and knees, directly out of the water, with a large medicine dropper. Springs and waterfalls often give rise to thick growths of moss that must be pulled apart strand by strand to retrieve the tiny mites clinging to the leaves and stems.

What are we trying to learn from the study of mites that live in water? Well, we have been collecting information on quite a variety of different things. One fact that may surprise a great many people but is no secret to entomologists in general is that most of the estimated 1,000 species of water mites occurring in Canada are unknown to science. This means that in a field trip 50 miles from Toronto we can easily collect species not only that we cannot identify but that may never before have been described in a scientific publication. There is a tremendous amount of work to be done in describing our fauna to make it possible for workers in other areas of aquatic biology, especially water quality control, to identify the multitude of mites occurring in natural aquatic habitats.

Not only do we have difficulty in identifying the species of water mites, but for those species and genera that we recognize easily, there is little information as to where across this country and throughout North America they occur. Thus, another major contribution to the knowledge of Canadian freshwater fauna that proceeds from ROM studies is the distribution records, the geography of water mites, so to speak, which can tell us what mites may be expected by biologists working

Left: The scanning electron microscope (SEM) reveals intricate details of the underside of the water mite's body.

*Above: An SEM view of the mouth of a water mite (*Limnochares americana*). Two needle-sharp jaws (chelicerae) project through a delicate circular membrane. (Both photos D. Barr)*



Top: Parasitic water mite larvae clustered on their mosquito host (Photo D. Barr)

*Bottom: Repeating flash captures a swimming mite (*Limnochares americana*) four times in a quarter second. (Photo Bruce Smith)*

in water anywhere from New Brunswick to British Columbia. A recent survey by Dr. Ian M. Smith (made possible by a grant from the Canadian National Sportsmen's Show) showed that the ROM mite collection, which he helped establish as a student assistant, now contains over 55,000 specimens. This represents the largest body of information on Canadian water mites available anywhere in the world.

Some of this information is obtained from studies carried out by other agencies. At present Mrs. Helen Sutton, a part-time research assistant in the department, is identifying mites from large collections made during Environment Canada's study of aquatic systems in the Mackenzie-Porcupine drainages of the Northwest Territories. From these collections we are learning the type of mites that live in some of Canada's far northern waters.

An additional, rather more esoteric, aim of the systematic studies of water mites is to deter-

Top left: The interference contrast microscope not only makes tiny transparent mite larvae easier to examine but also produces vivid colour effects. (Photo D. Barr)

Top right: A female pond mite (Eylais sp.) deposits hundreds of bright red eggs in the spring. (Photo Helen Sutton)

mine something of the evolution of the group. It is fairly certain that all the mites of the water mite type that we find in fresh water today were descended from terrestrial mites something like the bright red velvet mites that one occasionally sees in garden soil. The question of how an air-breathing, land-roaming animal learned to live, swim, and complete its entire life history under water is a fascinating and exciting one. To me, it is equally as interesting as the story of how amphibians first came onto the land, leaving the marine habitat of their fish ancestors. Data from several ROM mite studies are analyzed to give more clues to the possible ways in which one group of mites may have accomplished this remarkable feat.

Biologists are always very curious about what is termed the "life cycle" of a creature. And we who study water mites are no different. We need to be able to identify the young, the immature stages, and to do this it is necessary to understand a complete life cycle. Most adult water mites swim freely in open water and are carnivorous, preying upon minute aquatic crustaceans (water fleas) and on the tiny larvae of some aquatic insects. When male and female mites have mated, the female lays a number of salmon-coloured or reddish-hued eggs, usually on a bit of underwater vegetation, and within a week to ten days, these hatch to give rise to six-legged larvae, so small as to be next to invisible to the naked eye. Some species come to the surface of the water soon after hatching, and after a large larval emergence there appears to be a fine red dust floating on the surface of the water for many, many square yards. Each dust particle is a larval mite, waiting there for an aquatic insect to break the surface of the water. To complete the life cycle, each larva must parasitize an insect and feed on the insect's body fluids.

When a swimming beetle surfaces to breathe, it may be

Portrait of a water mite in a typical resting position (Photo Bruce Smith)

latched onto by half a dozen larvae that run quickly under its wing covers and attach themselves. After feeding to repletion, the engorged larval mites drop off and cling to a piece of submerged vegetation, entering a resting stage known as the nymphochrysalis. Inside the stretched larval skin, a major reorganization is taking place; the animal which eventually breaks out has four pairs of legs, looks not much different from the adult except that it is not sexually mature, and is called a nymph. The nymph swims freely and is carnivorous like the adult, living very much the same kind of life. When it has fed sufficiently on its tiny crustacean prey, it too settles down and enters a resting stage, the imagochrysalis, from which the adult mite eventually emerges.

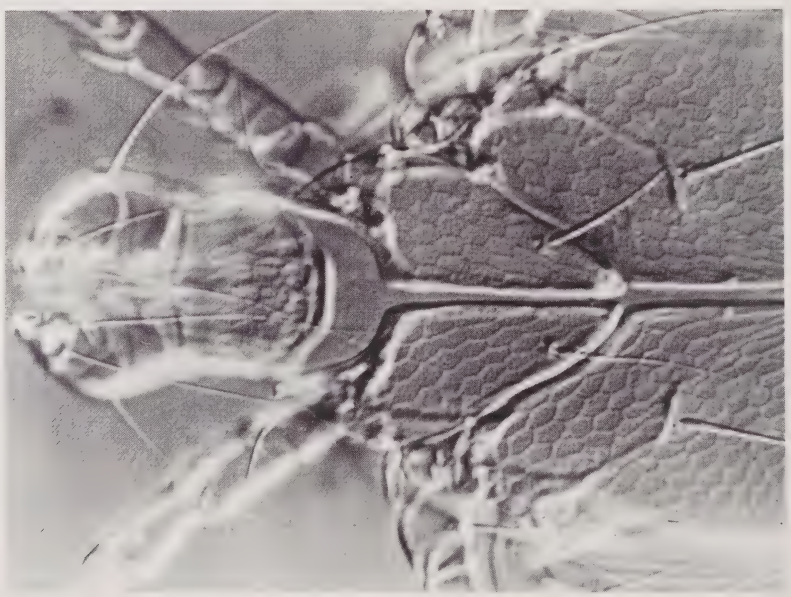
The life cycle of different mites takes place at various times of year, and the winter might be spent by different species in the egg, parasitic larval, nymphal, or adult stages. Some mites have given up on insect hosts altogether and instead parasitize freshwater mussels. To study the cycle, we frequently bring living mites into the laboratory and try to rear them through the various stages in their life history.

In the arsenal of the biologist there are quite a few techniques for studying mites: ordinary light microscopy gives magnification of up to 1000 times, whereas the scanning electron microscope can give good surface pictures up to 30,000 times larger than life. Photography plays an important role, and some of our staff, particularly Mrs. Helen Sutton, have produced with 35 mm camera, bellows, extension tubes, and short focal length lenses some of the most remarkable photographs of water mites ever made.

Bruce Smith this past summer spent almost all of his time photographing swimming mites with a movie camera. His purpose was to determine for the first time how mites really swim. Watch one with the naked eye—its eight legs seem just a whirling blur. There is no obvious rowing or dog-paddle motion to help us understand how the animal actually propels itself through the water. However, analysis of motion picture frames shot at high speed has now given us a clear picture of exactly what these originally terrestrial animals must do to cope with their new aquatic habitat. Hopefully, the different ways in which different types of mites have achieved this end will give us further information about how their remarkable adaptation to the aquatic environment has evolved.

Bruce has been working this year on a large, red, baggy water mite known as *Limnochares americana*, and our trials in obtaining sufficient numbers of the species for experimental work were severe. On one field trip we spent long hours collecting with a dip net in the usual way, finding only a handful of animals. We learned by the end of this trip, however, that the ideal way to collect the species was to cruise slowly in a canoe in shallow water, no more than two feet deep, with one man paddling in the rear and one in front, bent over the side, peering down into the water below. *Limnochares* is one of the few mites large and bright enough to be readily visible from above the water, and when one was spotted, the canoe was stopped and the sighter would stick a net over the side, pick up the specimen, and place it in a collecting jar. Two or three hours of this practice netted us many more mites than a day and a half of our ordinary technique.

Granted that studying mites is



Structure of the hard-bodied, swimming larva of a highly evolved water mite, revealed by the interference contrast microscope (Photo D. Barr)

an adventure and a challenge, is it at the same time worthwhile? What are the goals that we have always before us in our search for the minute?

I suppose one of the most basic aims of the studies on water mites is to improve our knowledge of the organisms that live in freshwater ecosystems. Water is becoming more and more important to human life and fresh, drinkable water for industry, recreation, and domestic uses is fast becoming a scarce commodity in North America. We have to learn a great deal more about our water resources and about methods of managing them intelligently so that we can conserve that which we have. But intelligent management is only possible when the system is fully understood. Freshwater animals, especially ubiquitous groups like water mites with many different species and many different preferences for varying types of natural water, are absolutely essential to understanding the characteristics of fresh water and the signs of its deterioration. The basic systematics of water mites is a major contribution in itself to this end, for those species which we can identify are the ones upon which we can do further meaningful research.

The study of water mites is also the study of animal interactions, for in learning more of the way in which water mites parasitize aquatic insects we are discovering additional facts about the way that any parasite and its host are associated. This understanding involves enquiry not only into the details of the parasitic relationships we can observe today, but also into the method by which the parasitic way of life evolved for these animals after they entered the aquatic habitat.

Then too, investigations which yield systematic information frequently provide new insights into mechanisms of animal biology. The swimming studies being done here and earlier ones on the mechanism of spermatophore production in water mites are both examples of Museum research on functional biological systems in these animals that were previously unknown. Once again, when we can better understand how an animal works, how it behaves, how it succeeds in living, we can better understand its association with its habitat and its place in the ecology of the freshwater system.

Finally, and perhaps most important in the long run, I hope that by unravelling the history of a spectacular evolutionary event, the invasion of fresh water by terrestrial mites, we shall gain some insight into the workings of evolution. This powerful process that has created all of the diversity and magnificence of life around us is still but imperfectly understood in its everyday operation. If we can improve our knowledge of how major changes of this nature have allowed particular groups of animals to become highly successful, perhaps by analogy we can perceive some of the strategies that man must adopt in order to adapt to a rapidly changing world and so ensure his survival as a species.

SEM *photograph of unusual spoon-shaped hairs on the foot of a water mite (Photo D. Barr)*

Although David Barr officially joined the ROM *in 1968, he had been associated with the Museum since 1962 as an undergraduate student assistant in the Department of Entomology and Invertebrate Zoology. Research carried out between 1963 and 1967 led to publication of the Museum's handbook of Ontario crayfishes.*

In recent years his interests have centred on the classification and evolution of water mites. As an avocation, Dr. Barr writes in a popular vein about creatures without backbones and photographs them as well. He hopes to introduce more people to these amazing animals that outnumber all vertebrate species by 9 to 1.

The great adventure of John McNeely McCrea's life commenced when most men are content to lose their remaining years in dreams. At the age of seventy he began to carve history in wood.

For the next twenty years, until two years before his death in 1957, this fine artist carved, whittled, and turned wood with a fierce dedication. He recreated the world of the pioneer in the Ontario of more than a hundred years ago. As McCrea wrote, when he lent the first pieces of his collection to the Royal Ontario Museum, "The historic rather than the artistic has been my aim."

Despite his disclaimer, the artistry is apparent. With painstaking skill he crafted hundreds of small models, exact in every detail, from the pioneer's first log shanty and early farm implements to his later home, his school, his church. His models range from grist mill to carpenter's shop, from sawpit to bridges. There are the soap-making utensils and equipment for making maple sugar, the harness shop and the shoemaker's shop. In a word, he made early Ontario live.

This unique collection has had several moves since the first models were lent to the Royal Ontario Museum in 1940. As McCrea added to the collection, more space was required. For a time some of the models were in storage, but in 1972 the collection was moved to "Pioneer Ontario", a specially designed gallery in ROM's Sigmund Samuel Canadiana Building. Here the models have historic meaning, placing our heritage in proper perspective. As visitors to the gallery view the more sophisticated Canadian furniture in nearby rooms, McCrea's models are testimony to our simple beginnings. They show how great was the inventiveness and energy of

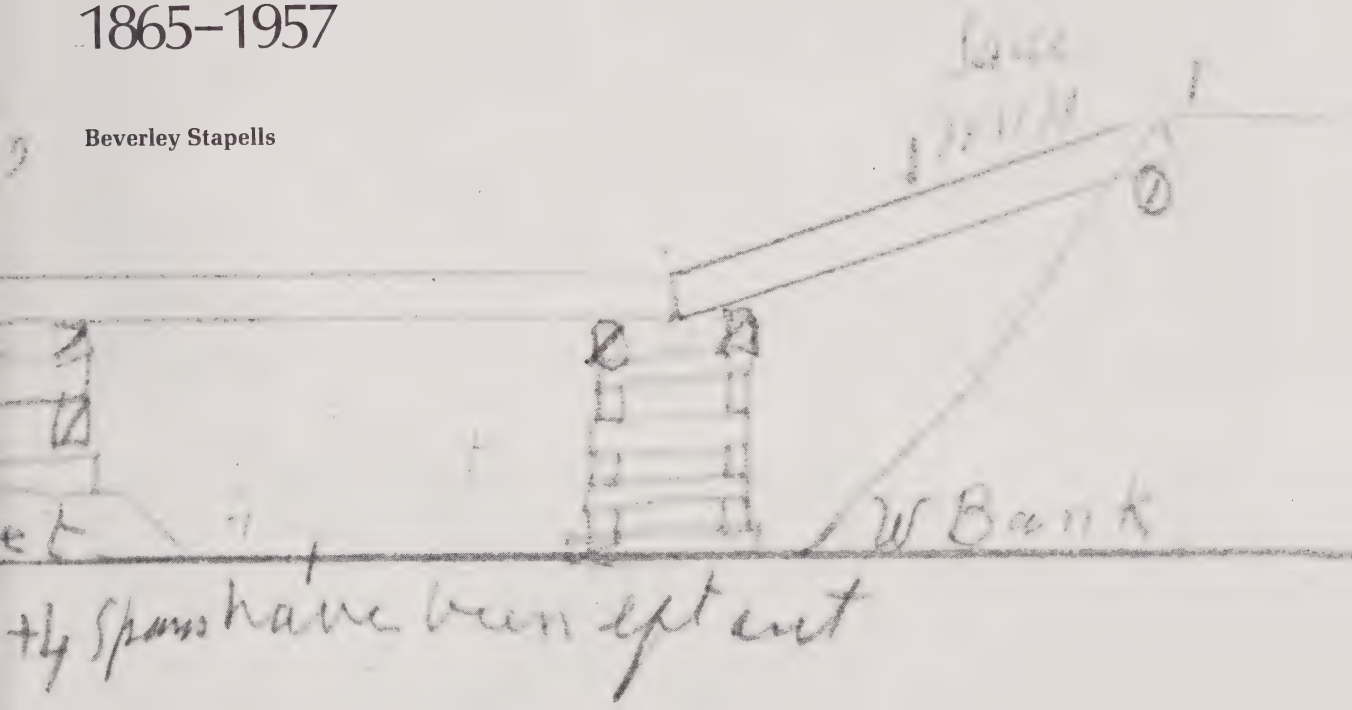
Above: John McCrea in the basement workshop of his Toronto home where he continued to make models during the last few years of his life (Photo Fae McCrea)

McCrea's sketch for a model of an 1875 mill bridge at Omemee

He Carved History

John McNeely McCrea
1865–1957

Beverley Stapells



the pioneer as he faced the formidable wilderness.

Over the many years that the McCrea models have been exhibited at the Museum, thousands of school children have seen them, learning by observation. The ROM's education department has found them invaluable in classes on pioneer life. Not only school children are fascinated by the miniatures. Older people who may remember some of the early farm implements are delighted to see once again the grain cradle, the flail, and the drag. Visitors to Canada and newly arrived immigrants share their interest. Using the models, the National Film Board of Canada produced a film, *Pioneer Life in Upper Canada*, and in 1958 some of the models were shown at Brussels World Fair, where five million people visited the Canadian Pavilion.

When McCrea began his model-making, he was living in Toronto. Behind him were years of carpentry experience in Omemee and years of war and world travel. As he described it himself in a letter, "The date of my birth, what I was endowed with at birth, and all that happened to me till I was 70 years of age, qualified, taught and steered me into scale model making."

At the outset he had no idea where his model-making would lead. He made a butter ladle, liked it; then he made a milk house. However from the beginning he did establish a frame of reference—early Ontario of the mid-1800's—with which he was familiar. He set himself a scale to work to; most of the models are to the scale of one inch to the foot; the larger ones are half an inch to the foot; the smallest, the United Empire Loyalist group, are one-quarter inch to the foot.

He had a keen eye and a retentive memory. He researched each piece he made in detail. If he did not have an original from which to copy, he would try to find one. He made frequent trips to Omemee on these quests.

Before McCrea started the construction of his models, he made careful sketches on paper. Some of these are in the Museum files. They are drawn in pencil, usually on graph or white paper. The drawing of the windlass for Crown's Bridge is on the back of a form letter from R.S. McLaughlin soliciting funds during the war for the Navy League of Canada. Some are dated.

The basement of the house served as the workshop. McCrea worked in fairly limited space, beneath well-wrapped water pipes suspended from the ceiling. At different times he would work upstairs, at the dining table or a card table.

His only son, John, now a professor living in Pittsburgh, recalls that his father worked only in the daytime, about two hours in

the morning, two in the afternoon. Some of the models took only a few hours to make; the grist mill took two years. He never used tweezers, but rather pliers. Rarely did he use a magnifying glass.

McCrea's only power tool was a pedal-operated grinding wheel, which he himself made, and this operated as a driving wheel for his wood-turning. Examining the tiny models—for example the scratch awl, with its handle the size of a tear-drop, or the arrowbacks and stretchers in the chairs—one wonders where he could find the necessary precision tools. The fact is he made them, using great ingenuity. He used nails and old hacksaw blades which would be shaped for a particular job, and often used only once. On the larger pieces, he would use normal tools, a plane, coping saw, chisel, jack knife, and so on.

For the metal parts in the models, like the hoops on barrels and the jack (iron basket) on the jack-light fishing boat, McCrea fashioned nails, wire, and tin cans into the shapes he desired. He adapted hardware and toys.

Most of the models are assembled with wood pegs, as the originals would have been. At first his models were of the same woods as the originals, but later he used birch and pine. When glue was required, he used cabinetmaker's glue, mixed to the required consistency.

Shaping the wood for his models required great patience. In the models there is a steaming outfit which illustrates how wood was softened in a steam box. We see a small furnace and above it a long box in which wood strips and planks were moistened. Nearby are the curved forms or moulds where the prepared wood was set and bent into shape. There are three forms. Most beautiful is the gently S-shaped one for bending snathes. To make all these models with curve and line, McCrea soaked his wood, then placed it in prepared frames to be held while drying, a process which sometimes took several days.

The models in the Pioneer Ontario Exhibit in the Canadiana Building are separated into different aspects of pioneer life. The sequence begins with farming. Here is the settler's first dwelling, a shanty of notched logs, easily and quickly erected, without pitched roof or chimney. The front of the shanty is two logs higher than the back, giving the simple roof a slant for drainage. McCrea, ever conscious of the instructive quality of his models, roofs the shanty with three different methods then in use; hollowed half-logs, arranged in scoops, squares of bark, and cedar shooks.

In his first year the settler had to clear enough land to plant some crops. The wooden-pegged drag (an early harrow) made from the crotch of a tree could be manoeuvred easily between tree stumps. Here is the grain cradle, the walking plough, the land roller. Close by is the log barn, sturdily constructed to last a pioneer's

Opposite page: McCrea's model of a typical Ontario kitchen of the mid-1800's. Apples and herbs hang drying from the beams, the brush broom stands by the door, and the Bible rests on the mantel.

Left: The shoemaker's shop. Leather was softened by soaking in the tub. Close by are forms for boots and shoes, and a roller for hammering seams.

lifetime. McCrea made this as his colonist ancestor had, a fine-looking structure with mortised corners and a shook roof fastened with wood pins. Always conscious of detail, McCrea did not chink the top logs of the barn; these were spaced for ventilation.

In the same case there is a stoning machine, a massive extractive implement designed for removing boulders. McCrea remembered in his boyhood there had been such a machine in the Omemee area. One of his long searches revealed the wreckage in a pile of stones on a farm near Lang, and from this he made the reconstruction. The model for the stumping machine was based on one used on a farm south of Omemee.

As we move on through the display, we find the settler has prospered. Here is the United Empire Loyalist group of models. On the revolving turntable we see a shingled house, with a stone chimney. Near the house is a hollowed log for a goose nest, and another hollowed log for a dog house. Here is the milkhouse, and a single-legged stool for milking jittery cows, if you don't want to use the regular three-legged stool. We see the chipyard and its string-thin draw knife and the root house.

Close by is the sugar-making equipment. Imported cane sugar was expensive, and the fortunate farmer with a maple bush would have used these iron pots to boil down his sap. A nephew of McCrea's, Arthur McCrea, remembers visiting his uncle when he had just completed a tiny bucket, which he thinks may have been for collecting sap.

"I asked my uncle how he made it, so he showed me. He took a wedge of wood, the height of the bucket he wanted, then he set his plane, and the shavings he planed off were the staves. Then my uncle laughed and said, 'You know, I cheated a little. I got the rings to hold the staves in place from a jeweller's.'"

Next is the lumbering sequence. The lumber camp, sawpit, and shingle-shaving models were the ones that went to the Brussels Exhibition. Lumbering vies with the fur trade for the distinction of being Canada's earliest industry. Lumberjacks opened up densely forested areas for settlement. By 1810, Canada was supplying Britain with 50,000 shiploads of lumber annually for the British Navy. Here in McCrea's models we see how logs were hauled through the bush to the rivers, then floated or tumbled in rafts or cribs downstream to ports. The camboose, where the lumberjacks lived, is probably much like the one in which McCrea's father was housed while working in the woods his first winter in Canada. Contrasting with the heavier equipment in this case is a gem, a small frame saw, its finely serrated blade the result of hours of filing.

The grist mill, like the sawmill, was one of the earliest necessities of a small settlement. McCrea's grist mill is a working model. It took two years to build the intricate, two-floored mill with its conveyor belt, bolting equipment, sieves, and millstones. The mill dam, water wheel, and flume, he added later. The model is dated 15-4-1953 and initialled in McCrea's hand.

Now we come to larger models, the house, school, and church. Here the scale is half an inch to the foot. By the stage of development recreated in McCrea's model, settlements had solid community buildings. The house here has a pitched and shingled roof, with many-paned windows, squared-log construction with mortised corners, and a stone chimney. McCrea even has the latch string out, reminding us of where our modern by-word for hospitality has its origins. The latch opened the door from the inside. During the day, the string attached to the latch would hang outside the door for easy entrance. At night it was drawn inside.

The model of the schoolhouse is a copy of the original in Omemee, built in 1840. When the school was torn down in 1936 it was being used as a henhouse. McCrea was present at the demolition, and took all the necessary measurements. He made his model from a schoolhouse log he had sent to Toronto.

The church, a model of a typical Methodist structure of the period, was the last model McCrea made, two years before his death. It is of white clapboard, with a shingled roof and a tinplate spire topped by a goldleaf orb. We can see the enclosed pews with their small doors, the wood-burning stove, and behind the pulpit the upholstered red sofa, a standard piece of furniture in the church at that time.

Egypt fascinated McCrea. A former undertaker, he was interested in funeral practices in pharaonic times.

A neighbour, Mrs. Sills, still remembers the day Mrs. McCrea came to her house and asked if "John might have some of the red material from the dress I had made. He said I would be commemorated in the church pulpit if I could oblige." Mrs. Sills' red dress material is there today.

With the developing community came the artisans. In the shoemaker's shop we see a bag of pegs for fastening soles, a tub for water to soften the leather, and a deer's shin bone for shaping boot fronts. The leather here and in the harness shop McCrea cut from old gloves. There is the carpenter's shop with each finely worked tool, and nearby the brickmaking operation.

McCrea liked bridges. In the transportation section of the exhibit are three different kinds of bridges all originally in the Omemee area. There is Cowan's rolling bridge, operated by a windlass, a corduroy bridge, and the old Williamston covered bridge. There are dugout boats and a punt, sleighs and wagons.

Perhaps the most interesting of all the models for small children is the farmhouse kitchen. From the open beam in the room hang different herbs, and cut pieces of apple and pumpkin are drying. These came from the McCreas' garden. At the end of the beam is the earliest flycatcher, a tiny pair of wood paddles. These would be coated with molasses, and anyone passing beneath them clapped them together. A turkey-wing duster hangs by the stairs.

Against the fireplace is the new iron stove, with its copper boiler. In fact, McCrea made the stove of wood and coloured it to look like iron, by soaking it in bootblack. The woven rug is the product of his own method of weaving. Near the kitchen, the household equipment—spinning wheel and butter churn, apple and cheese presses—reminds us of the independent self-sustaining character of the home in the 1800's. Everyone worked. They had to, if they wanted to survive.

John McNeely McCrea came from such a community of independence and industry. When he was born in Omemee in 1865, the town had left its pioneer beginnings far behind. Like scores of other Ontario villages which developed beside rivers, Omemee was a self-sufficient entity providing goods for its own use and for export. It had a sawmill and a grist mill, a carding mill and a spinning mill. There were a foundry and tanneries, along with a brickyard and a lime kiln. The young McCrea grew up in an environment that many years later he would recreate.

John McCrea was one of eight children born to John McCrea and Jane McNeely McCrea. A sister of young John's, Flora, later became Lady Eaton. Years later Lady Eaton would proudly display her brother's milkhouse model in a prominent position in Eaton Hall. Her eldest son, Timothy Craig Eaton, now has the model in his home in England.

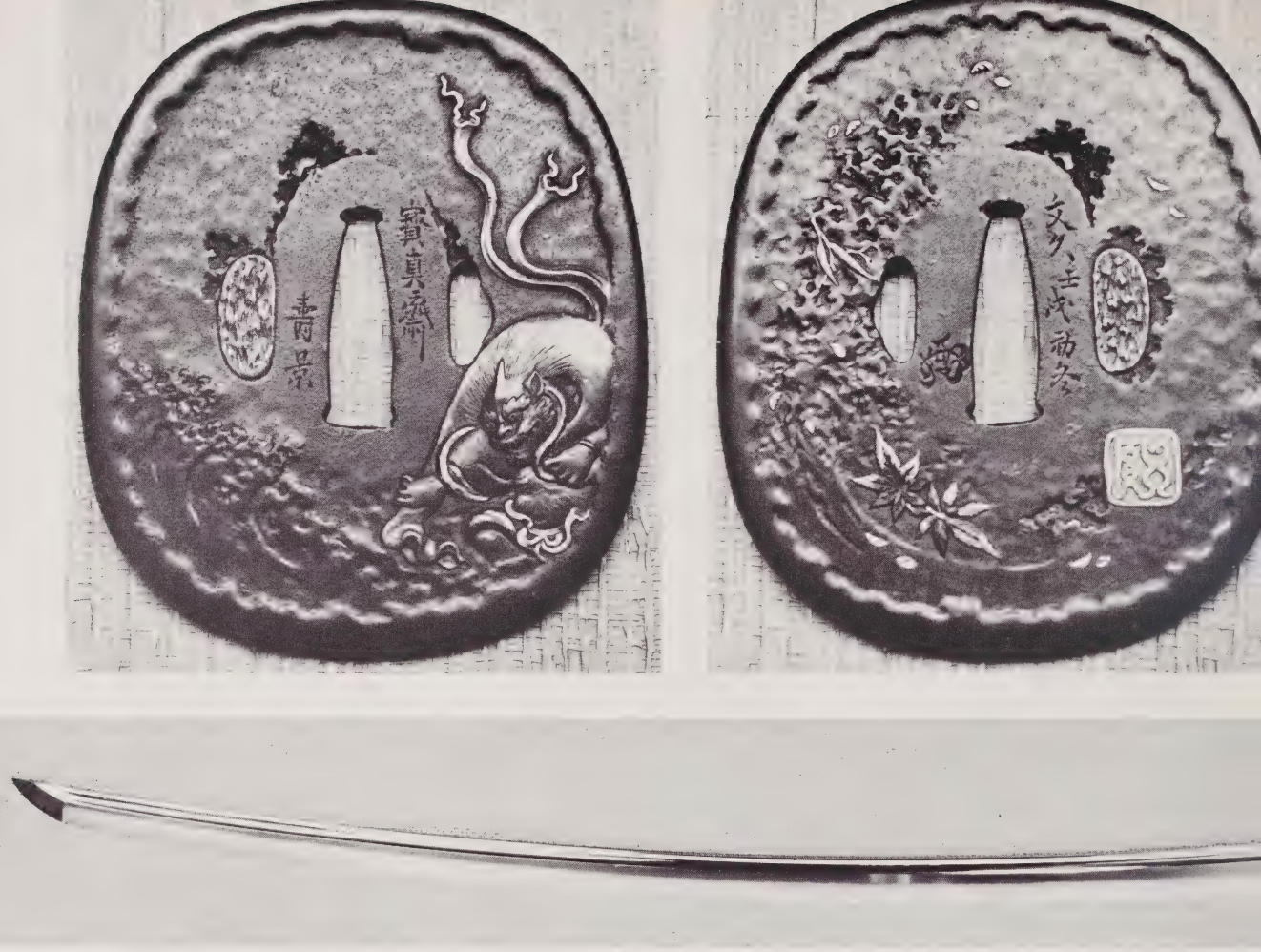
Over the years McCrea built barns and houses in the Omemee area, helped his father in the furniture store, and was the town's coffin-maker and undertaker. He fought in the Boer War, and in the First World War went overseas as a major with the Victoria and Haliburton Regiment.

In 1920, he married Frances Morden, the town's school principal, and moved to Toronto. In one of his letters McCrea writes, "Without the hearty cooperation of my wife this [model-making] would not have been done." She spoke at luncheons and at the University Women's Club on her husband's models, wrote the only book on his collection, and shielded her husband from noise and confusion.

During the thirties McCrea took a round-the-world trip. A favourite family story concerns an incident that occurred while he was in Egypt. His daughter-in-law, Fae McCrea, recalls that during his visit to Cairo he made himself a cane. It had an ebony head and tip with an ironwood shaft turned on a bowstring lathe. While carving King Tutankhamon's cartouche, which he planned to inlay in his cane, he became ill. Sensible as he was, McCrea did not discount the possibility of being visited by a curse for having forged King Tut's signature, so he shipped all the parts of his cane home. His illness vanished.

After his world travels McCrea returned to Toronto, and, for inspiration, to his Omemee roots. In his basement workshop he relived those youthful days and embarked on an adventure which lasted the rest of his life—the McCrea models.

Beverley Stapells graduated from the University of Toronto in 1948, with an Honours degree in Modern History. She joined the staff of the Royal Ontario Museum in 1969, working on a part-time basis in the education department. In this capacity her favourite children's classes are those in Canadiana and Pioneer Life. A former newspaper reporter, Mrs. Stapells has been active for many years with the Canadian Institute of International Affairs. She is married to a Toronto lawyer and has three daughters.



Token Kai

The Friendly Invasion

David Pepper

An unusually cool summer night had fallen on the fog-ridden coast of Southern California. Small groups of people gathered in sequestered corners of the hotel, talking in low and earnest tones, exchanging knowing glances. An air of tense expectancy spread through the entire building. For two days they had been arriving, singly or in small groups, from various points of the globe, nothing to mark them from ordinary hotel guests save the long and rather sinister parcels that almost invariably accompanied them.

A puzzled desk clerk approached me. "What's going on? All these people are wander-

Top left: Front and back views of an iron hand-guard (tsuba) with inlays of gold, silver, and coloured metal alloys, made by Toshikage of the Tanaka School of Edo. Dated to 1862, it depicts the wind god Fujin releasing a fierce tempest from his bag. (All photos by author unless otherwise noted)

Bottom left: A long sword by the master smith Tadakuni, c. 1660, one of ROM*'s finest blades (Photo Leighton Warren)*

Right: Detail of a temporary exhibit of samurai arms and armour in the 3rd-floor Japanese Gallery

ing around talking in a funny way—English and something else all mixed together—and what are they carrying in those long cases, guns?" I could see visions of an underworld gathering—a sort of mobsters' Jet Set—dancing in his head, so I set the record straight. "Oh no, not guns—swords." I said, "It's the Token Kai!", leaving him as baffled as before.

The Token Kai is a specially formed group of students and collectors of the Japanese sword whose aim is a better understanding of this highly specialized art form. In June of 1974 they held their second major conference fifty miles south of Los Angeles.

Perhaps of all the weapons in

Top left: Typical Japanese inro *(utility case) of four sections in gold* makie *laquer technique, with a large ivory* manju netsuke *("caked-shaped toggle") showing Chinese youths (*ROM *collection)*

Top right: An early 18th-century iron tsuba *with its inspection certificate (Author's collection)*

Bottom: Close-up of ROM *blades: top, by Tadakuni, mid-17th century; middle, by Kunimasu, late 17th century. In the background is a 19th-century war-coat with two family crests.*

the world the Japanese sword has acquired the greatest mystique. With its supernatural connotations, its deadly keenness and graceful lines, it has inspired not only its own countrymen but a host of Occidentals to great depths of admiration and awe. Though its origins can be traced back more than a thousand years, this revered weapon bears closely on our own time. Less than a hundred years ago *samurai* still stalked the Tokyo streets, a pair of swords at their left sides, and even during the Pacific War officers of the Imperial Forces carried traditionally made blades into battle. More recently, world-wide interest in the so-called Oriental martial arts has stimulated a new generation of devotees to pursue the cult of the *samurai* sword. Four years ago the renowned author Yukio Mishima committed suicide by *hara-kiri*. Immediately after this spectacular act of self-immolation, the prices of swords in Japan rose to alarming new heights, particularly blades associated with the Magoroku school of smiths, for the dirk he used was of this manufacture. It seemed almost as if by the mere association of names all Magoroku blades

had a direct connection with the bloody death of Mishima.

Separating sensationalism from fact has never been an easy task, and the false mythology which has grown up around Japanese swords has too long and too often obscured the more fascinating truth. The clarification of the truth, by the sharing of knowledge and experience, was one of the major objectives of the Token Kai in organizing two major symposiums on Japanese swords and related art. The first of these was held in Dallas, Texas, in the autumn of 1972, and both were conducted in collaboration with the Nippon Bijitsu Token Hozon Kyokai (Japanese Society for the Preservation of Art Swords). The NBTHK conducted in Dallas the first official *shinsa* (formal judging of swords) ever to be held outside Japan. A panel of experts spent five days examining blades and sword fittings. Later certificates of inspection were issued from the headquarters of the Society at the Sword Museum in Tokyo for all genuine pieces of good quality. These Japanese authorities and a number of their colleagues from the West gave a series of lectures covering various aspects of the

Top: The shinsa *or judging room at the Los Angeles conference, showing swords laid out for inspection on cloth-covered tables*

Bottom: Copper tsuba *with iron rim, guilt copper inserts, and designs in gold and silver inlay. Utemada School, late 16th to early 17th century (*ROM *collection)*

An iron wasp and an iron snake, both life-size and having fully moving joints, were made by Japanese armourers as exercises of skill. (ROM collection)

field, most of which were published in 1972 as *The Book of the Sword*.

A highlight of the Dallas conference was the *Meibutsu* ("special attraction") Room, containing an exhibit of some of the best swords, blades, and separate fittings to be seen in this hemisphere. As a representative of the ROM I assisted in setting up the display and took with me a number of art objects from our own collections. Two of the Museum's finest sword blades were displayed in the Meibutsu Room: a magnificent *katana* ("long sword") by the 17th-century master Tadakuni, and a rare blade by his contemporary Kunimasu. The former blade has a cutting-test inscription inlaid in gold, which states that in 1662 it cut through two human corpses at a single stroke.

The conference in June of 1974 at Newport Beach, California, had the same general format as the 1972 Dallas meeting, but added another field of interest: wood-carving and lacquer-work, particularly *inro* and *netsuke* (the former a sectioned utility case and the latter a sort of toggle used to suspend the *inro* from the waist). These in themselves are magnificent examples of miniature artistry, and although to the Japanese they have never achieved the artistic importance of swords, they have an avid following in the West. The great numbers of enthusiastic collectors attending the special *netsuke* exhibit and programmes bore witness to this fact.

Once again a specially appointed team of Japanese experts conducted the *shinsa*, examining over two thousand items in the course of five days, often working well into the evening. They were assisted by a small army of volunteers who did such jobs as tagging, measuring, recording, and making rubbings of signatures. Each submission was individually photographed or described. Brought from private and other collections all over the world, these artifacts included fully mounted swords, blades, edged polearms, and sword ornaments, the last in many cases being exquisite examples of fine metalwork.

I had originally planned to go to the Newport Token Kai as the ROM's representative, taking some special materials for exhibit and study. However as my plans were under way I was officially asked to act as the Programme Chairman for the sword division, and in that capacity set up a programme of films and lectures and introduced speakers as well. In spite of some unforeseen stumbling blocks, it was possible to present a series of films on swords and their manufacture. There were also lectures and discussions with several experts on such diverse topics as the making, polishing, and restoring of swords, metalwork techniques, schools of artisans, and forgery of signatures.

As a rule the ancient occupations of sword craftsmen are confined to the Japanese themselves. Two of the American speakers are exceptions. One is a swordsmith and the other a polisher; both learned their craft during years of study in Japan. I myself gave a slide lecture, "Art, History and the Sword", liberally illustrated with material from the ROM collections.

The Meibutsu Room, here as at the Dallas conference, displayed in specially constructed table cases some of the finest swords and related items ever assembled. A special section of the room was devoted to the display of articles other than sword-fittings, but also made by Japanese metalworkers. The ROM lent several artifacts for the display, among which a blade unearthed from a 6th-century Dolmen tomb is of particular interest. This was by at least 400 years the oldest sword in the exhibition. Several *tsuba*, or hand-guards, from the Museum collections were on exhibit, as well as two particularly fine jointed animals. Such fully moveable creatures, in this particular case a wasp and a snake in iron, were made as an exercise of skill by armourers.

There has been much controversy over the importance of such functions as the Token Kai, and I would be quick to offer constructive criticism of several aspects of these meetings. But their usefulness in encouraging human exchange remains unassailable. For far too long the collection and study of Japanese swords was a secretive and selfish preoccupation—knowledge and often misinformation were carefully hoarded—and there was great jealousy and even greater greed among many collectors. These things do not disappear overnight, but a new age for the attitude of sword enthusiasts has dawned. The sharing of ideas, launching of theories, and exchange of information are among the most valuable purposes of any conference; only through such intercourse can true understanding begin.

Heated words have been bandied about concerning the validity and accuracy of papers issued by various sword study groups in Japan; I have no intention of passing judgement on such matters, but one important point should be made: each piece examined by such groups is recorded carefully with a full description, photograph, or rubbing. This system, as accurate as a police fingerprint file, has very obvious advantages in tracing lost or stolen artifacts.

Within the ROM's collections are excellent examples of Japanese metalwork, including blades made by high-ranking swordsmiths. Several among these are in need of expert restoration before they can be publicly displayed. This is an expensive process and can take a long time to carry out, but would be worth many times the cost in view of the final results. Meanwhile, displays are being evolved to include those items in the collection that are presentable. At ROM there are usually three full cases of Japanese weaponry on display in the Armour Court, and a sword and metalwork case in the third-floor Japanese gallery. With the closing of the Armour Court for the Chinese Exhibition, a temporary Japanese arms and armour case was prepared on the third floor by the Art Department. This incorporated some Armour Court material, a few weapons held in storage for many years, and a fine suit of armour donated to the Museum by the late Lester B. Pearson. This is the first time the armour has been shown, and it appears seated on its own storage box in the traditional manner of display. Three *jinbaori* ("warcoats") from the collection of the Textile Department are displayed, one placed over the armour, just as it would have been worn. Glimmering surfaces of burnished steel, the warm glow of russet iron, rich laquer, the rainbow tints of dyed broadcloth and braided silk, mother-of-pearl, gold leaf, and deerskin stencilled in delicate patterns—these recall times both near and far when armed warriors, knights in the true sense, upheld their code of honour. The sword was their symbol, in their eyes the embodiment of their souls, and by it they lived—or died.

In the study of any branch of Japanese art it is extremely unwise to ignore the broad aspect: it is inevitable, given Japan's multi-cultural heritage, that all subjects are related in some degree. Nature, tradition, and varied cultural influences from China and other foreign countries have blended together in a rich amalgam. Folklore, customs, and language have influenced and been influenced in a never-ending cycle. Even the land itself, with its awesome capacity for sudden change by storm, earthquake, and volcano, has left a deep stamp on the character and culture of the people. Just as the sword, through the ruling samurai class, influenced the daily life of old Japan, so did the everyday affairs of the whole nation shape and change the sword. Thus it goes with all art, and thus it will continue through all of man's existence on this planet.

David Pepper, pictured here in the guise of his Japanese alter-ego, Morita Ichiro.

Mr. Pepper has been a student of Japanese art and folklore since he was in high school, devoting particular attention to arms, armour and metalwork. His greatest concern is for the preservation and restoration of such artifacts, and he is actively engaged in restoration projects both in the Museum and at home. At the moment he is designing and building a completely authentic Japanese room and garden to fit into his century-old house. Mr. Pepper joined the ROM over eight years ago and is now Co-ordinator of the newly formed Art Department.

Persian Castle on the Silk Road

Excavating a Sasanian Hunting Lodge

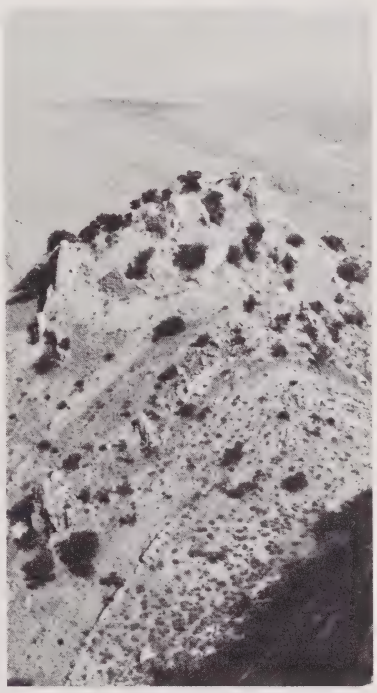
Edward Keall

In June of 1965 I was a student in Tehran, hotly pursuing "the Sasanians in the Western Zagros". My fellowship at the British Institute of Persian Studies permitted me the remarkable privilege of studying whatever aspect of mediaeval Persian archaeology I saw fit. At times it seemed like a passport to endless mountains of rice and lamb stew and the dubious honour of hundreds of bone-wearying miles in or on all manner of assorted transports—buses, taxis, trucks, mules, bicycles in every conceivable state of repair, and my own two feet as well.

That June I had at my disposal the use of the Institute's long-wheel-base Land Rover to get to my site. Fortunately for me there were also in Iran at that time two notable ROM archaeologists surveying the western Zagros for pre-Sasanian materials: T. Cuyler Young, Jr. and Louis D. Levine. In a gentlemanly gesture they promised me that if I could get a driver to take the Land Rover to Qaleh-i Yazdigird, they would come and pick me up, vehicle and all, in three weeks. The mission seemed more dramatic when, on the way in, the Land Rover eventually came to a halt in the dung and straw beneath a large plane tree on the edge of the village we were heading for, some eighteen hours drive south-west of Tehran. The villagers stated quite strongly that we were the first motorized transport ever to enter those precincts. The only other recorded visits of archaeologists were those of Major Rawlinson, during his march through the mountains in 1839, and of Colonel Tchirikov, a member of the commission which surveyed the Turkish-Persian frontier in 1849-52.

I had a *sondage* permit to work near the village at the site of Qaleh-i Yazdigird, a name which means literally "the castle of King Yazdigird". The permit allowed me to work just long enough to sink a hole and draw a few rapid conclusions, before withdrawing gracefully with plans to return again should the site seem a promising one. I had first heard about Qaleh-i Yazdigird while seated on a Turkish beach in 1964. Christopher Weightman, then also a fellow at the Institute, was in Iran studying the Ahl-i Haqq or "Worshippers of the Truth", a Muslim sect of Persian dervishes.

During his research he had visited a shrine of theirs in Kurdistan and his talk of an "ancient long wall" intrigued me. It sounded Sasanian from the way he described it. The Sasanians were a Persian dynasty who ruled Iran between the 3rd and 7th centuries A.D. They had a particularly distinctive way of building masonry with rubble stone and gypsum mortar, so that it was



Peak with remains of a fortress overlooking the archaeological site at Qaleh-i Yazdigird

Left: Iranian-Metalwork-Silver: Sassanian Silver Plate: Peroz I shooting ibexes with bow and arrow. The Metropolitan Museum of Art, Fletcher Fund, 1934

Portions of the long defensive wall with the remnants of a guard chamber

Right: Detail of a frieze on the stucco wall unearthed at the site of the hunting pavilion

possible to identify the wall from the descriptions, without having seen it first. On my return to Iran the following year, I managed to reach the site by a three-hour mule ride there and back from the river. The mules were pack animals with no saddles. On the first visit I did not linger long. This brief reconnoitre revealed that the site consisted of a long defensive wall, a residential and an upper castle, a series of look-out posts and garrison quarters, and what was probably once an enclosed garden with a pavilion. The site looked promising enough to request a *sondage* permit.

When the permit was granted I was assigned a Mr. Rahnamoun as the government representative to look after my interests and to make sure that I acted in accordance with the laws of the Iranian Archaeological Service. Qaleh-i Yazdigird is not far from the Iraqi border. Smugglers were reputed to be able to snatch, unnoticed, a blanket from a person sleeping on a roof. How Mr. Rahnamoun would have acted in that eventuality I do not know, but he was also there to assist in the bargaining over how much wheat I would destroy in the course of the work. In fact, the wheat had already been harvested and little compensation had to be paid to the local farmers.

My objective was to dig for Sasanian pottery since there was little known about it at that time. Pottery is the fundamental tool of the archaeologist, for in theory it enables him to date everything else found in association with it. There was ample evidence of pottery in the form of potsherds in the stubble, but none in a stratified context. That is to say that none of it had survived in the ground where it had originally been either deliberately discarded in the rubbish heaps of Sasanian times or accidentally buried in the collapsed debris of the settlement. The pottery visible on the ground was there only because of erosion and the centuries of outwash since the site was abandoned in the

seventh century A.D. The success of the mission seemed threatened unless other diagnostic material could be found with which to date the ruins. The ruins still seemed very Sasanian but there was no firm proof of it yet.

As often happens, the local people know where the goodies are. One of the fields goes by the name of Gach Gunbad, or Plastered Dome. Now unfortunately this name does not reflect the survival of an ancient tradition attesting the existence of a domed building on the spot. Rather it is where the dervish community was in the habit of digging for old plaster to repair the dome of their shrine. They would dig up the Sasanian plaster, fire it in a kiln, and so produce plaster of Paris, whereupon they could use it in the obvious way by simply adding water. Acting on the direction of the locals, I laid out a test trench where fragments of plaster appeared on the surface. Our focus was now on stucco instead of potsherds.

Almost immediately we encountered courses of baked brick, just inches below the surface. Our first impression was that the wall had toppled over, for the bricks were laid on edge. But that just happened to be the peculiar way they had built the wall—in vertical lays, with each course laid at right angles to the preceding one. The bricks one saw were, in fact, the top of the wall buried below ground. Large pieces of plaster began to appear as we dug lower alongside the wall. Gradually it became clear that not only was the top of the wall decorated with a broad frieze of geometric and stylized floral patterns, but broken plaster and stucco statuary had fallen down beside the wall, probably during an earthquake. The collapsed rubble had helped preserve the wall in its own debris. We reached the original floor over ten feet below present ground level.

That was all we managed to do in the time allotted by the *sondage* permit. The rest of the three weeks was spent surveying the ruins standing above ground and measuring, amongst other things, the long wall (2½ kilometres) with the aid of army compass, fifty-metre tape, and one of the crew, Muhammad Ali, who held the end of the tape.

Muhammad Ali was also the local huntsman. One evening he came back with a partridge which he had shot on the cliffs above the village, using a fire-arm pratically Sasanian in age. I have a great deal of respect for this type of huntsman. I had accompanied others on the other digs in Iran in search of gazelle or mountain sheep. Such hunts usually took one into wild mountain country, over scree and up ravines. Mountain leopard is not unknown. The best part of the hunt was the eating of the gazelle liver, spit-roasted on the spot. Then would come the chore of hauling the prize down the mountain on someone's back. The hunter really paid for his triumph.

There are more game laws in Iran now than there were in 1965. Muhammad Ali's gun has been confiscated by the government as part of the general programme to disarm the tribespeople. One must also have a licence to shoot game. It is a creditable attempt to conserve Iran's dwindling wildlife. But it takes game out of the hands of those who hunt for food and gives it to those who hunt for sport.

Other evening activities of the workmen at Qaleh-i Yazdigird, even after a full day's work, involved the wheat harvest. When

Iranian workmen back-filling the excavation to preserve the site until the next dig

I visited the site in December 1973 the winter wheat was already springing up in the fields. Ploughing for spring sowing was in full swing. Harvest is in mid-June. The orchards produce cool-weather crops like walnuts and apples, but the climate is mild enough to allow pomegranates to be grown. The grapes are delicious. During the summer many of the women and children move up to the pasture in the mountains with the flocks, while the men stay behind for the harvest. It is a pattern of transhumance probably followed in Sasanian times. The fat-tailed sheep of this area produce the cooking oil which is famous throughout all Iran. Vegetable shortening has been introduced on a large scale, but the traditional Iranian favourite is still *Kermanshah roghan*.

The portion of the site which we excavated, as already explained, is called locally Gach Gunbad. It seems that here, originally, there was a pavilion set within an enclosed garden. It was a *paridaeza* or garden of paradise in the traditional Middle Eastern sense: an area of irrigated gardens, surrounded by a wall, and contrasting with the harsher and at first hostile environment of the open terrain or wilderness. It is in this sort of environment that the mediaeval Persian nobility were accustomed to sit and be entertained by music and the recitation of poetry. Stories would relate the heroic exploits of the huntsman and his noble attack upon the savage prey. More true to life, the captive game would be driven into the enclosure to be shot ignominiously by the pampered potentate. The decadent life-style associated with these pastimes, attended by partying and entertainment after the hunt, will probably be revealed as further excavations uncover the decorations that adorned the stuccoed pavilion.

We get some measure of the amount of pomp and circumstance at the Sasanian court from an Arab chronicle in which there appears a description of a Sasanian king's audience chamber. It would be more correct to speak of a "King of Kings", since the empire of Iran at this time consisted of many small kingdoms as well as the central provinces governed from the capital. The whole agglomeration fell under the sway of one imperial majesty. The text, written by Ibn Ishaq some two hundred years after the fall of the Sasanian dynasty, in the ninth century A.D., nevertheless gives a colourful picture of the legendary pomp at the Sasanian court. The passage relates how "Khosrow I, Anoshirvan, used to sit in his audience hall where was his crown, like a mighty bowl set with rubies, emeralds and pearls with gold and silver, suspended by a chain of gold from the top of the arch in this his audience hall, and his neck could not support the crown, but he was veiled by draperies till he had taken his seat in this his audience hall, and had introduced his head within his crown, and had settled himself in his place, whereupon the draperies were withdrawn. And no one who had not previously seen him looked upon him without kneeling in reverence before him."

Now it is doubtful whether Qaleh-i Yazdigird was ever the property of the King of Kings, or even that of a king. But it is likely that ceremonies conducted in the castle and garden pavilion mimicked in some way those at the imperial court. There is even a passage in one of the 13th-century Arab geographies by Yaqut which seems to refer to an estate in the general area occupied by the ruins of Qaleh-i Yazdigird. "At this place there is a large *eyvan* (vaulted chamber) and a great terrace in front of it, and the traces of a ruined garden built by Bahram Gur. They declare that the snow falls in the quarter of the hilly district; but never falls on the side which faces Iraq." The Arab writers had a tendency to extol the greatness of Sasanian monuments since it was that empire which the Arabs had so dramatically defeated in the seventh century. But it is particularly interesting that the legend should associate an estate in the area with Bahram Gur, the King of Kings. For it was he above all who was immortalized in Persian poetry and art as a great hunter. He actually met his death while hunting—in pursuit of the wild ass.

The reference to snow in the

chronicle just mentioned is also interesting. For again, when I visited Qaleh-i Yazdigird in December it was crisp, sunny, and mild, while an hour's drive away, higher up on the Iranian plateau, the cloud hung low and the ground was covered with frozen snow. Qaleh-i Yazdigird is on the border between the hot lands and the cold. The site was in all probability the estate of a feudal lord, a self-contained residence, supporting itself by agriculture and by taxation of the surrounding lands. It is unlikely that we shall ever find a royal audience-hall or a jewel-studded crown. Apart from the pleasure pavilion or hunting lodge, the rest of the site contains traces of garrison quarters, look-out posts, and massive defences. While that seems very mundane it is also true that in all likelihood the elaborate defences of Qaleh-i Yazdigird were in part designed to protect the great highway which runs below the site and from whose traffic the route took its exotic name of "the Silk Road".

Meanwhile, we should return to the story of the excavations. An inventory of the stuccoes taken from the wall was made and photographs were taken. The workmen were paid off, and on the horizon appeared, as promised, my rescuers in the second vehicle ever to visit Qaleh-i Yazdigird. It was being driven by T. Cuyler Young and Lou Levine who were surveying the area for other sites which might be of interest to them to dig. Their subsequent exploits on behalf of the ROM have been amply documented in the pages of *Rotunda*. We all spent the night on the roof of the one-room school house, carefully clutching our blankets around us to foil the smugglers. Next day, after an uneventful night disturbed only by the mosquitoes, we loaded the stuccoes into the Land Rover, the large pieces bedded in straw and the small pieces in two suitcases, and made the tortuous journey back to the great highway.

Crossing the ford was a nightmare. Should the vehicle stall it would quickly fill with water and irreparable damage would be done to the Sasanian stuccoes. We would eventually be left with a shapeless mass of plaster of Paris. Happily, we emerged safely and delivered the stuccoes intact to the Iran Bastan Museum in Tehran. We plan to return to Qaleh-i Yazdigird in the spring of 1975 under the auspices of the ROM to learn more about this mediaeval Persian estate and hunting lodge, and hope that the pursuit will not be in vain.

The author and local huntsman Muhammed Ali with the fruits of a hunt near the site

Edward J. Keall is Assistant Curator in the West Asian Department of ROM. Born in England, he was educated at Sheffield University (B.A. 1961) and the University of Michigan (Ph.D. 1970). From 1962 to 1967 he participated in various archaeological digs in the Middle East, and from 1962 to 1965 he was a fellow of the British Institute of Persian Studies in Tehran. He joined the ROM in 1971 and is also on the faculty of the University of Toronto Department of Islamic Studies. In place his interests focus on Iran but range in time from Alexander the Great to Genghis Khan.

The Growing Collections

In September, David Nagorsen and Brian Herbert of the ROM Department of Mammalogy conducted field work in the Dominican Republic and collected four specimens of the rare Dominican fig-eating bat, *Phyllops haitiensis*, and a specimen of the Haitian flower bat, *Phyllonycteris obtusa*. Confined to the island of Hispaniola, these two species are rare in scientific collections. The former species has been described in the scientific literature on the basis of three live specimens and a small number of skulls found in caves; the latter species has been described from only three skulls found in caves. A study of morphology and chromosomes will help to determine the affinities of these two bats with related species on adjacent Caribbean islands. The photographs by David Nagorsen are of a female *P. haitiensis* (ROM 72782; top) and a male *P. obtusa* (ROM 72783; bottom).

Since the Mineralogy Department last reported in *Rotunda*, 370 specimens have been registered into its collections. Among these are the type specimens of four new minerals: tulameenite from British Columbia, described and presented by Dr. L.J. Cabri of the Mines Branch in Ottawa; liebenbergite and bonnaccordite (both on the same specimen) from the Republic of South Africa, described and presented by Dr. S.A. de Waal of the National Institute for Metallurgy in Johannesburg; and pinchite from Terlingua, Texas, described at the ROM by Mr. B.D. Sturman and Dr. J.A. Mandarino. The pinchite was presented to the ROM by William Pinch of Rochester, New York, in whose honour it has been named.

Other species have been acquired, which have not previously been represented in our collections. We now have söhngeite and schneiderhöhnite (both from Tsumeb, South West Africa), ktenasite from Colorado and isostannite from England, all presented by Mr. Pinch. Pyrophanite from St. Hilaire, Quebec, was presented by Mrs. V. King of Maine; osarizawaite from Australia was obtained by exchange from Dr. Jiri Just of Australia; and armstrongite from the USSR was presented by Dr. J. Gittins of the Department of Geology at the University of Toronto.

A number of specimens from the collection of the late Mr. William Ringsleben were registered and came as a gift from Mrs. Ringsleben in honour of her late husband. Mrs. C. Peat presented a collection of minerals from Finland and Norway.

A magnificent beryl crystal (variety morganite) from Brazil, in a matrix of albite and black tourmaline, was purchased. The crystal measures 11 cm in diameter and is pictured here. A fine cuprite from a new find in South West Africa was acquired by exchange with Mr. Charles Key.

The Harry Wearne Collection in the Textile Department has long been famous for its Indian painted and dyed cottons made in the 18th century for the European market. These, however, form only part of the Wearne collection, which contains, besides, many French and some English printed cottons of the same period. The French woodblock-printed cottons alone number about two hundred, and research is revealing that this is one of the most important collections of its kind. Whenever possible, we have acquired items to enhance and broaden the collection. This year twenty-four pieces were added, including both monotone and polychrome examples. The detail shown here has exotic flowers and foliage against an unusual yellow background. It is taken from a design probably issued in the 1780's by the Oberkampf factory at Jouy en Josas, when there was a revival of interest in patterns inspired by those of the Indian painted and dyed cottons of the first half of the century.

A recent acquisition in the ROM's West Asian Department is this octagonal condiment dish with eight circular compartments arranged around a central well (974.68.2). Compartmentalized serving dishes have a long tradition in Islamic as well as Chinese dinnerware. On the sides, pairs of rabbits are depicted in blue, green, black, and purple underglaze. Although the floral ornament imitates the "Isnik" wares of 16th- and 17th-century Ottoman Turkey, the dish was probably made by Persian admirers of the Turkish product. Its crackled glaze suggests kinship with the so-called "Kubachi" ware of 17th-century Persia.

The Bishop White Committee

Louise H. Stone

Rev. and Mrs. White in China's Fukien province, where White served before becoming Bishop in Honan. Photo reproduced from Lewis Walmsley's Bishop in Honan *(University of Toronto Press 1974)*

It is an old saying that "it is better to be born lucky than rich, for it is possible to achieve riches but luck is an unknown quantity". This saying could well apply to the Royal Ontario Museum, for it was not born rich but it was born lucky. One of the first outstanding pieces of good luck came its way when Charles Trick Currelly walked through its doors. He drew to him and gathered around him a group of men and women in both the scientific and archaeological fields who were to make the Royal Ontario Museum the first museum in Canada.

One of Dr. Currelly's luckiest "finds" was Bishop W.C. White, who in 1934 was appointed first Keeper of the East Asiatic Collection. Bishop White went to China in 1897 and became associated with the Royal Ontario Museum when he undertook in 1924 to act as its agent in acquiring examples of the archaeological treasures then appearing on the Chinese market. During this undertaking he obtained for Toronto most of the material dating to the pre-Christian era in China. This includes important finds from An-yang and Lo-yang which make this Museum's collection of archaeological material one of the most important in the world. Other spectacular contributions were the group of wall paintings from two monasteries in Shansi, and The Mu Chinese Library, housed until recently in the Library of the Far Eastern Department and now a part of the library of the Department of East Asian Studies in the University of Toronto. When W.C. White retired as Bishop in Honan in 1934, Dr. Currelly lost no time in appointing him first Keeper of the growing collection. In the same year Bishop White was appointed Associate Professor of Archaeology (Chinese) in the University of Toronto, but in 1943 a School of Chinese Studies was created by the University, with Bishop White as its first Director. Classes were held in the Museum, and in spite of a full teaching program he found time to publish several books in the series "Museum Studies", a monograph on the Chinese Jews, and a great number of articles in the *Illustrated London News* and elsewhere, all relating to objects in the Chinese collection. He remained affiliated with the Museum until his death in January 1960, an enviable record of twenty-six years.

A few weeks after Bishop White's death a group of friends, headed by Mrs. H.J. Cody, got together to consider providing a memorial to this man who had accomplished so much for the Museum. The group became the Bishop White Committee. Mrs. Cody enlisted the help of Dr. W.J. Dunlop, then Minister of Education, to act as Chairman, and in February 1960 the present Committee Chairman, Mrs. Edgar J. Stone, succeeded Dr. Dunlop in that role. After careful consideration it was decided to establish an endowment fund for the Far Eastern Department. This fund was known for several years as the Bishop White Fund. Recently the name was changed to the Far Eastern Endowment Fund (in memory of Bishop W.C. White), as this title was felt to be more explanatory. The fund is supported entirely by the efforts of the Bishop White Committee.

The first undertaking of this committee was the publication of a biography of Bishop White. The University of Toronto had started but not completed this project, so the Bishop White Committee carried on, retaining the author that the University had selected, Lewis C. Walmsley. Dr. Walmsley spent many years in China and was closely associated with the Bishop for some years in the Museum. The Committee is happy to report that this project was completed, and the book, *Bishop in Honan* (University of Toronto Press) was published at the end of 1974. It is the fascinating story of a man who made a large and lasting contribution to the ROM.

The Far Eastern Endowment Fund will now become active, annually contributing half the income from the invested fund to the Far Eastern Department and reinvesting the other half of the income to increase the corpus of the fund. Extra monies are always helpful for publications, student summer employment, special research activities, important lecturers, and such projects. An ideal goal would be to send a scholar to study in China.

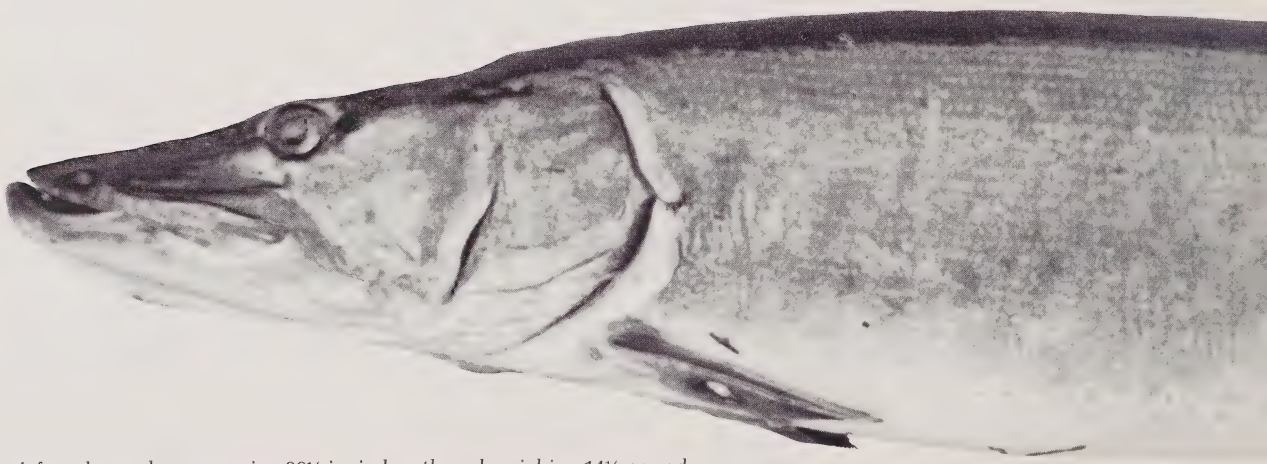
At present the Fund is making its first contribution to the Far Eastern Department, $1000 for the purchase of rare books.

The fund has been created and operated entirely by the efforts of a committee of eight volunteers, so that the normal expenses of such an endeavour have been eliminated. To raise funds, Christmas cards have been sold, and courses of lectures have been given on the Museum's outstanding collection. The courses of morning lectures, for which only limited space is available, have always been over-subscribed. The Committee has regretted the restricted number of accepted applicants and is grateful for the patience of those who cheerfully waited for the next course. The entire staff of the Far Eastern Department has co-operated in a most generous and unselfish manner, and for this the Committee will always be grateful.

All earnings and donations are invested and contributions to the Fund enjoy tax exemption.

Musky!

ROM Research on an Important Sport Fish



A female musky measuring 36¼ in. in length and weighing 14½ pounds

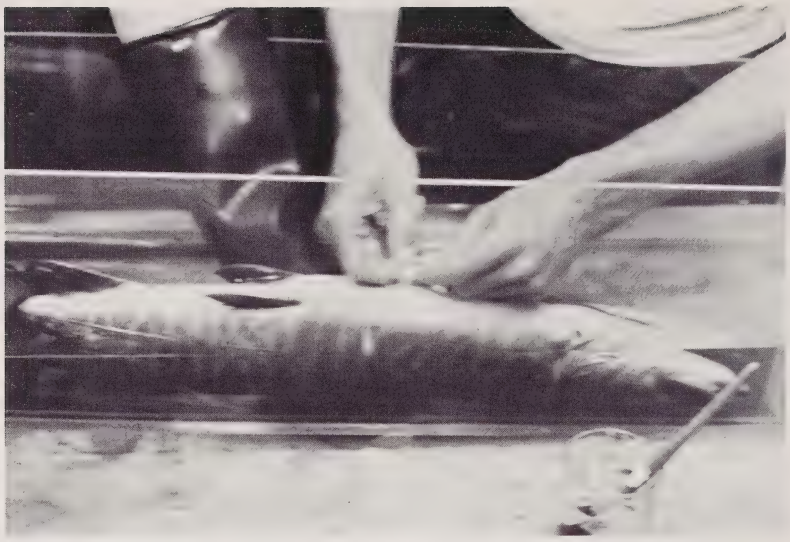
E.J. Crossman

Thousands of anglers react to the word "musky" with excitement and reverie. It conjures up visions of large fish lost, of cold, wet and quiet days spent with similarly afflicted friends in quest of one of North America's largest and most exciting fresh water sport fishes. A good deal of what attracts these anglers, men and women, may be size: to exceed the present accepted angler record one must catch a musky weighing seventy pounds. What's more, one must lure, hook and successfully land an extremely strong fish which is capable of several leaps a yard out of the water and which may take thirty to forty-five minutes to boat. In North America there are at least three organizations of anglers with thousands of members who pursue only the muskellunge (or maskinonge as it is officially known in Quebec and Ontario). When you consider that it takes on the average 100 hours of angling to capture a musky of legal size, you begin to understand the serious attitude these people bring to their "leisure pursuit".

In Canada the muskellunge populations are concentrated in the upper St. Lawrence River, the Kawartha Lakes, the Niagara River, Georgian Bay, Lake Nipissing and the Lake of the Woods region. The fish take three to six years to mature sexually and become capable of adding to the stock, and the numbers of muskellunge seem to be limited by specialized spawning and feeding habits. Until 1900 thousands of pounds, consisting mainly of larger individuals, were taken by commercial fishermen. Since the 1930's there has been concern over dwindling numbers, decreased angler success and the reduced size of the fish caught.

The ROM has long been concerned for the well-being of musky stocks and has participated in most Canadian research on the species. My special research interest at the ROM has been all of the fishes in the closely related group to which the muskellunge belongs. Several very basic questions having direct implications for the management of the stocks of muskellunge have long bothered me. What, for instance, defines the number of muskellunge that any habitat can carry? What contribution to the population of adults, and to the angler's creel, is made by young muskellunge artificially reared in the hatchery and released in public waters? What is the fate of sublegal muskellunge (under 28 inches total length) when they are released after undergoing the rigours of angling, boating, measuring, and photographing?

Starting in 1973, I had an opportunity to seek answers to some of these very questions at Nogies Creek. The Nogies Creek Fish Sanctuary, near Bobcaygeon, Ontario, in the Kawartha Lakes district, is a small muskellunge habitat under the jurisdiction of the Ontario Ministry of Natural Resources and consists of an 80-acre lake and four miles of meandering river. Dams at the top and bottom of the sanctuary prevent loss of fishes. That, the restricted size of the habitat, and the absence of anglers make it an ideal site for research on this important sport fish. Concern for this species led, in 1951, to the establishment of a muskellunge research project at Nogies Creek,



Implanting an ultrasonic transmitter in the body cavity of an anaesthetized musky

Opposite page: Lifting one of the cube-shaped trap nets in which the captured muskellunge can swim freely before examination

with funds from the Toronto Anglers' and Hunters' Association.

No work on the muskellunge had been done at this site since 1965. In 1973 I spent one week of each summer month on the site to assess whether the muskellunge population still warranted the expenditure of time and funds in an attempt to answer the questions outlined above. My becoming involved at Nogies Creek completed a cycle, as I had been the first student researcher when the project began in 1951. Conditions proved satisfactory, so, aided by Canadian National Sportsmen's Show funds, work commenced early in May 1974, with near freezing temperatures and snow on the ground.

Two students, Mr. Tom Whillans, University of Guelph, and Mr. Fergus McNeil, University of Toronto, were hired to carry out the ongoing work which I hoped would help answer the questions posed. They were joined later by Mr. Oliver Bertin, an M.Sc. student in Zoology at the University of Toronto. I spent the first week of May, the month of July and every other weekend on site.

In summer '74 we initiated and tested several projects which may become parts of an integrated programme over several years. Summer field periods are limited to the four months from May to September, and with an ambitious plan such as ours, fair weather meant intensive outdoor work. In foul weather, activity turned to the more leisurely indoor work of keeping up with the records and data.

One daily routine was the netting and tagging of muskellunge to ascertain what had happened to the population since 1965. We also tried to learn what we could about the ecological associates of the muskellunge, both animals and plants, and to follow through a season some of the physical and chemical characteristics of the habitat. Although biologists glibly talk of a "typical" muskellunge habitat, I know of no detailed description of one, so we will accumulate information on all possible aspects of it. The tagging involved daily trips to six trap nets. These nets retain fish in a large cube of netting, in which they swim freely. All species caught were counted, examined for indication of previous capture and released. Each muskellunge was anaesthetized, measured and weighed; scales were taken for age determination, and a small, numbered, plastic tag was inserted in front of the dorsal fin. After recovery from the anaesthetic the fish was released. Often more than a thousand fishes a day, of all species, were handled in this way. After the nets were emptied, on different days, the periodic sampling programmes for water chemistry, water temperature, plankton, dissolved oxygen, other fish species, bottom organisms and plants were carried out. Measures for mapping bottom contours and calculating stream profiles and flow were also taken. With a programme of this nature the evening meal was very often at the fashionable hour of 10 p.m. This was no real hardship, though, since work could often be broken off for refreshment. In fact tea breaks seemed to increase to six, the number of opportunities in a day for young, hard-working students to take on nourishment. Meals seemed to me a far cry from the years when I was cook and meals were at more usual hours, and satisfying but plain. Two of the students baked breads of great variety and mysterious content. There was a considerable interest in natural foods and natural cookery, and cookbooks were as well thumbed as technical books.

The graduate student, Oliver Bertin, as well as helping with the other phases of the work, had the

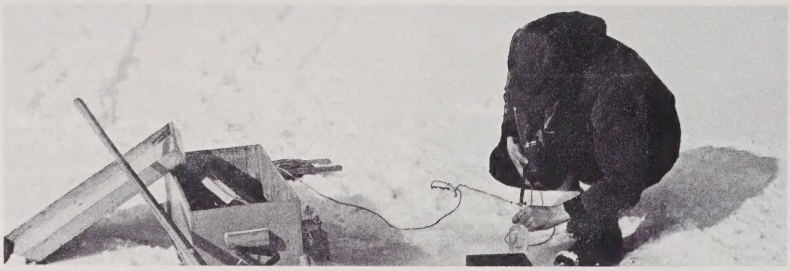
independent task of studying the growth rate and food of the rock bass inside and outside the sanctuary. This species, accidentally introduced into the sanctuary about 1957, constitutes both a competitor and potential predator of the young muskellunge.

In July and August we investigated the feasibility of, and requirements for, two activities projected for 1975. In July we tested a technique for studying muskellunge home range, territory, and local movements; this was in order to determine the carrying capacity of a habitat in terms of the number of muskellunge per acre. Large, adult muskellunge were captured and retained in a plastic holding pool fifteen feet in diameter and three feet deep. This pool proved to be both a worrisome security problem to us and a definite attraction to visitors. Several forty-inch-long muskellunge swimming around leisurely within reach presented quite unforeseen attractions to people of varying interests and inclinations.

The laboratory was transformed into a surgical theatre. Individual muskellunge taken from the pool were deeply anaesthetized and, under suitable life-support and sterile conditions, underwent surgery with all the trappings of surgeon, sterile instruments and instrument assistant. In the body cavity of each fish we implanted a transmitter which emitted a known number of clicking, ultrasonic pulses. After the transmitter or "tag" was implanted, the fish were sutured, treated with an antibiotic and returned to the pool for post-op recovery and observation. After several days of recovery, seven of these muskellunge, individually known by their ultrasonic pulse rate, were released at different places in the study area. Dr. Aivars Stasko of the Marine and Fisheries Service, Canada Ministry of the Environment, a specialist in this type of telemetry, brought to the site the underwater microphone (or hydrophone) and receiver necessary to "track" or follow the movements of these "bugged" muskies.

This work attracted considerable public interest, and was featured in a half-page article in the Globe and Mail and in a ten-minute segment on CBC television. Furthermore, this longstanding research project is well known in the area, and visitors stopping to see and hear what was going on were a standard part of the scene. Throughout July and August visitors averaged twenty per day. After the newspaper and television coverage the number increased, on one long weekend, to a maximum of 120. We took turns at the often perplexing but always worthwhile task of telling these people what we were doing, and why, and showing them about. It was good publicity for ROM and for the funding agency. For some of the smaller and more seriously interested groups that visited in early July we would put the hydrophone into the recovery pool to intrigue and amuse them with what we called "The Muskellunge Marching Band". When received simultaneously and amplified, the combination of slower and faster pulses emitted by the several implanted transmitters was very like the staccato rhythm of the snare drums of a marching band.

We followed these marked fish by regularly searching out each one with the hydrophone, counting the identifying number of pulses and noting the exact position on a chart of the study area. For periods of twenty-four hours we followed each of three pairs by noting their position every half hour around the clock. Each observer took a six-hour shift on watch. This required that we all take turns at the eery experience of making our way up or down a very tortuous, log-strewn,



In winter 1975 monthly trips will be made to the Nogies Creek site to study seasonal conditions.

Below: The author prepares to place a hydrophone in the lake, hoping to pick up ultrasonic pulses emitted by "bugged" muskies.

mist-shrouded, narrow river at 2 a.m. to change the watch. One of my night watches coincided with the time when Venus moved close to the moon; the night was clear and this spectacle relieved some of the monotony of the vigil.

Since this summer's exercise indicated that the tracking equipment worked in the weedy habitat and provided very useful information, its use will be expanded in 1975. I also found it exciting. I see ultrasonic tracking replacing angling, just as photo safaris have been substituted for hunting safaris. The search for the "bugged" muskies can generate as much suspense, excitement and acceleration of heart rate as a first-rate adventure novel. After several periods of moving the canoe to a new location, sliding the hydrophone quietly into the water and listening, the first faint clicking sound indicating the presence of one of the fish was a genuine thrill. After initial location it was necessary to stalk the animal from several sides in order to pinpoint its location by triangulation without disturbing it. All the elements of the chase were there.

August brought the arrival of Dr. George Holeton, a fish physiologist in the Department of Zoology, University of Toronto. He set up his impressive equipment in the laboratory, having agreed to participate in the study by examining the consequences of musky fatigue and stress that follow release after angling. He is able to monitor the blood of a fish and follow the body processes as the animal attempts to recuperate from angling and release. The stress and fatigue were simulated in the holding pool in order to work out details of the way in which that project might be carried out.

It was fascinating to watch blood samples piped into the apparatus from a captive but free-swimming muskellunge; then to see the results of almost instantaneous determination of the amount of oxygen and various elements in the blood being flashed on a read-out indicator, and later the minute quantity of blood being returned to the fish without loss or contact with the air. Because of the positive results of this experiment, this procedure for analysing angling stress will be the other major activity in 1975.

Even the short two-week period of tracking bugged muskies seemed to confirm the idea that they moved about very little. This idea was found to be wrong, however, when we captured a musky in the lake, but released it about a mile upstream, in the river part of the habitat. In that case, the fish began to move downstream within two days and continued to do so until it entered a lake-like expansion of the river. It remained there a week, and the termination of the signal made it impossible to determine if it found its way back to the site of capture.

Residence and full-scale activity at Nogies Creek ended with the packing and storage of the equipment on Labour Day, in time for the students to return to university. There will be monthly trips to the site throughout the winter to study winter conditions, and if funding becomes available, the excitement will start again at the Nogies Creek Research Project shortly after the ice disappears next spring.

E.J. Crossman, Curator-in-charge of the Department of Ichthyology and Herpetology at the ROM, *was born in Niagara Falls, Ontario. He received his B.A. from Queen's University, his M.A. in Zoology from the University of Toronto, and his Ph.D. from the University of British Columbia. His particular interest is the systematics, biology and distribution of freshwater fishes. Since joining the* ROM *in 1957, Dr. Crossman has been involved with many zoological associations, among them the Canadian Society of Zoologists and the Canadian Society of Environmental Biologists. His field work has taken him as far as Europe, the United States, the West Indies and the Northwest Territories.*

ROM